PERSISTENCE OF ANTIBODY RESPONSE AFTER REVACCINATION WITH OIL-ADJUVANTED FOOT-AND-MOUTH DISEASE VACCINE

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SHORT COMMUNICATION

An accompanying paper (*1*) reported on the immune response of 72 cattle after vaccination with primary and double emulsion foot-and-mouth disease (FMD) vaccines. At the end of that experiment at 6 months post-vaccination the mean neutralization titers of the various experimental groups ranged from 2.2 to 2.8.

For the present experiment these 72 cattle were randomly divided in 3 groups, with equal contribution of each of the original experimental groups to the three new groups.

Cattle of group 1 were left without revaccination, cattle of group 2 were revaccinated with 10 ml of a double emulsion FMD vaccine and group 3 was revaccinated with 5 ml primary emulsion FMD vaccine.

The primary emulsion was the same as the standard vaccine 2 used for the first vaccination reported in the accompanying paper (*1*). The double emulsion was prepared from the primary emulsion vaccine by reemulsification with an equal volume of phosphate buffer solution (PBS), pH 7.4, containing 2% polyoxyethylene 20 sorbitan monooleate[3]. Details on the antigens, formulation and potency testing of that vaccine can also be found in that paper (*1*).

Tables 1 and 2 list the mean neutralization titers of the 3 groups of cattle for a period of two years after revaccination of groups 2 and 3. It can be observed that the neutralization titer of the unvaccinated group 1 gradually decreased to 1.75 and 1.83 for strains O_1 Campos and A_{24} Cruzeiro, respectively.

TABLE 1. *Mean of serum neutralization titers against FMD virus O_1 Campos of cattle after revaccination with oil-adjuvanted FMD vaccines*

Months post-revaccination	Not re-vaccinated	Revaccinated	
		Double emulsion	Primary emulsion
0	2.33 ± 0.43[a]	2.39 ± 0.61	2.49 ± 0.52
1	2.33 ± 0.34	3.55 ± 0.10	3.48 ± 0.21
3	2.16 ± 0.28	3.32 ± 0.43	3.26 ± 0.33
6	2.03 ± 0.30	3.25 ± 0.43	3.14 ± 0.35
12	2.13 ± 0.49	3.39 ± 0.35	3.17 ± 0.37
24	1.75 ± 0.43	3.14 ± 0.56	2.87 ± 0.45

[a]Mean and standard deviation.

TABLE 2. *Mean of serum neutralization titers against FMD virus A_{24} Cruzeiro of cattle after revaccination with oil-adjuvanted FMD vaccines*

Months post-revaccination	Not re-vaccinated	Revaccinated	
		Double emulsion	Primary emulsion
0	2.69 ± 0.55	2.58 ± 0.44	2.78 ± 0.58
1	2.30 ± 0.42	3.35 ± 0.28	3.50 ± 0.21
3	2.05 ± 0.48	2.94 ± 0.46	3.42 ± 0.23
6	2.10 ± 0.48	2.84 ± 0.51	3.27 ± 0.35
12	1.97 ± 0.52	2.78 ± 0.57	3.18 ± 0.46
24	1.83 ± 0.46	2.49 ± 0.50	2.90 ± 0.43

The mean neutralization titers for strain O_1 Campos of the groups of cattle vaccinated with the double or primary oil-adjuvanted vaccine remained at high levels throughout the post-revaccination observation period. Slightly lower values are obtained for strain A_{24} Cruzeiro which probably is due to the

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[3]Tween 80 – ICI America Inc. Atlas Chemicals Division.

composition of the A valency of the vaccines. Both the original vaccination and the revaccination were done with vaccines of which the A valency contained 50% A Bage, 25% A Venceslau and 25% A Cruzeiro. The mean neutralization titers against strain A Bage of sera collected 6 and 12 months after revaccination are listed in Table 3. It can be observed that those titers are similar or slightly higher than those for strain A_{24} Cruzeiro.

TABLE 3. *Mean neutralization titers of cattle against FMD virus A Bage*

Cattle groups	Months post-revaccination 6	12
Not revaccinated	2.48 ± 0.45[a]	2.39 ± 0.44
Revaccinated		
Double emulsion	2.89 ± 0.47	3.00 ± 0.41
Primary emulsion	3.03 ± 0.33	3.25 ± 0.29

[a]Mean and standard deviation.

When the primary emulsion vaccine was potency tested for strain O_1 in cattle at 30 days post-vaccination it protected 8 out of 8 cattle with the undiluted vaccine and 6 out of 8 cattle with the vaccine diluted 1:10 (*1*). The mean neutralization titers of these groups of cattle were 3.24 ± 0.44 and 2.81 ± 0.70, respectively. The mean antibody titers of cattle against O_1 Campos one year and two years after revaccination with the same vaccine were 3.39 ± 0.35 and 3.14 ± 0.56 for the double emulsion, and 3.17 ± 0.37 and 2.87 ± 0.45 for the primary emulsion respectively. It is most likely therefore that those cattle would have been protected against challenge with type O_1 Campos. This assumption is substantiated by the results of another experiment done at the Pan American Foot-and-Mouth Disease Center (*2*). In that experiment 30 cattle were exposed to this virus one year after repeated vaccinations with oil-adjuvanted vaccines. The neutralizing antibodies of these 30 cattle were of the same order as those obtained in the present experiment and all but one animal were protected at challenge.

It is our intention to continue studying the cattle of the present experiment without further FMD vaccinations in order to establish the persistence of antibodies for as long as possible.

REFERENCES

1. AUGÉ DE MELLO, P.; COSTA, K. de F.; ALONSO FERNANDEZ, A.; SUTMÖLLER, P.; POLLAK, A.; MILLAN, A. Influencia del grado de dispersión en la fase acuosa sobre la inmunogenicidad de vacuna antiaftosa con adyuvante oleoso. (Influence of the degree of dispersion in the aqueous phase on the immunogenicity of oil-adjuvanted foot-and-mouth disease vaccine). *Bltn Centro Panamericano Fiebre Aftosa 37-38*: 5-9, 11-15, 1980.
2. GOMES, I.; SUTMÖLLER, P.; CASAS OLASCOAGA, R. Respuesta en bovinos a la exposición del virus de la fiebre aftosa un año después de inmunizados con vacuna con adyuvante oleoso. (Response of cattle to foot-and-mouth disease (FMD) virus exposure one year after immunization with oil-adjuvanted FMD vaccine). *Bltn Centro Panamericano Fiebre Aftosa 37-38*: 25-29, 31-35, 1980.